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**Cross-country Differences in Innovative Entrepreneurial Activity: An Entrepreneurial  
Cognitive View**

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## **Cross-country Differences in Innovative Entrepreneurial Activity: An Entrepreneurial Cognitive View**

### **Abstract**

**Purpose** – The purpose of this paper is to clarify the relationship between entrepreneurial cognition and innovative entrepreneurial activity across countries using an institutional perspective.

**Design/methodology/approach** –The paper tests theoretical model using data collected by the Global Entrepreneurship Monitor (GEM), the Global Leadership and Organizational Behavior Effectiveness (GLOBE) study, and the Index of Economic Freedom (IEF). A Multilevel analysis is performed based on set of 1,004,620 observations from forty-nine countries spanning thirteen years (2001-2013).

**Findings** – The results suggest that in terms of formal regulations; the relationship between entrepreneurial cognitions and Innovative entrepreneurial activity becomes stronger when there is an increase in intellectual property right and business freedom regulations in a country. On the other hand in terms of informal institutions the relationship between entrepreneurial cognitions and Innovative entrepreneurial activity becomes stronger when the level of institutional collectivism and uncertainty decreases and performance orientation increases.

**Originality/value** – The study indicates that entrepreneurship by innovation increases when the individuals possess high level of entrepreneurial cognition under suitable institutional conditions (e.g. intellectual property right, business freedom, institutional collectivism, uncertainty avoidance and performance orientation).

**Keywords** Innovative entrepreneurial activity, Entrepreneurial cognition, Institutional conditions, Multilevel

## Introduction

For decades, scholars have sought to determine how and to what extent national institutions (formal and informal) influence entrepreneurial action, the entry of new firms, and the country's economic development (Linan and Fernandez-Serrano, 2014; Aparicio *et al.*, 2016). Research has focused on variations in entrepreneurial activity across countries and how such activity is associated with economic and social benefits (e.g., Birley, 1987; Audretsch and Thurik, 2001; Wennekers *et al.*, 2002; van Stel, 2005; van Praag and Versloot, 2007) and has emphasized the importance of the quality of the new business in this association (Wong *et al.*, 2005; González-Pernía and Peña-Legazkue, 2015).

Entrepreneurial scholars have conducted a wealth of studies the determinants of entrepreneurship in a variety of countries and have taken individual-level (e.g., Davidsson and Honig, 2003; Bhagavatula *et al.*, 2010) and macro-level (e.g., Autio and Acs, 2010; De Clercq *et al.*, 2013; Urbano and Alvarez, 2014) perspectives, but few have used a multi-level perspective. In a literature review, Alvarez *et al.* (2014), reported that 47.4 percent of the entrepreneurial research looks at entrepreneurial activity from a micro-level perspective and 45.3 percent have done so from a macro-level perspective. Researchers have agreed that multi-level and cross-level models are fundamental to entrepreneurship theory development, but little empirical research has sought to conceptualize and test theory that involves relationships that cross levels (Holcomb *et al.*, 2010). On the micro-level, scholars initially focused on personality traits (Rauch and Frese, 2007), entrepreneurial traits (Mueller and Thomas, 2001), motivations (Scheinberg and MacMillan, 1988), beliefs, and values (McGrath *et al.*, 1992; McGrath and MacMillan, 1992), but most of the more recent research shifted its focus to entrepreneurial cognition (Alvarez and Busenitz, 2001; Mitchell *et al.*, 2002; Shepherd and Krueger, 2002). Randolph-Seng *et al.* (2015) noted that entrepreneurship research has been “*individuals-focused, while ignoring interactions among those individuals, ignoring the context, and missing a meta-theory that takes into account these contextualized interactions.*” While this paper does not build a meta-theory, our theoretical framework contributes to clarifying the context within which the process of entrepreneurship happens.

While a wealth studies have addressed entrepreneurship, most have ignored the quality of the entrepreneurial effort's outcome (Autio and Acs, 2010). Innovation has always been a central theme in entrepreneurship research, but the determinants of innovative activity remain largely unexplored (González-Perní *et al.*, 2015). Policy-makers in advanced economies like those of the US and the EU have made efforts to promote conditions that nurture new ventures that introduce innovations into the market (see e.g. OECD 2010, 2011). However, we are left with the question concerning why some individuals get involved in entrepreneurial activity and introduce innovations by doing things differently, rather than just doing what is necessary to make a living. Our study addresses this question by exploring the conditions that are necessary to encourage the creation of innovative new ventures in various contexts.

Entrepreneurial cognition has been identified as an intermediary between institutional conditions and the creation of new businesses (Mitchell *et al.*, 2000; Lim *et al.*, 2010), but limited research has been performed on the relationship between national institutions and entrepreneurial cognition. Hayton and Cacciotti's (2013) review of the empirical research on entrepreneurship identified only two studies, Mitchell *et al.* (2000) and Goktan and Gunay (2011), that have addressed the relationship between national culture and entrepreneurs' cognitive processes, but these studies provided mixed results. Mitchell *et al.* (2000) examined whether entrepreneurial cognitive scripts vary across the cultures of seven countries and found that individualism and power distance are associated with entrepreneurial cognition. However, despite their empirical contributions to the relationship between culture and entrepreneurial cognition, neither Goktan and Gunay (2011) nor Mitchell *et al.* (2000) disentangled the effect of institutional conditions and entrepreneurial cognition on the entrepreneurial process (innovative entrepreneurial activity in our case). The

present study responds to the demand for more multi-level cross-country examinations of the interaction effects between individual-level entrepreneurial cognition and national-level institutional conditions, emphasizing entrepreneurial activities (De Clercq *et al.*, 2013; Aragon-Mendoza *et al.*, 2016). Such disentanglement is the main objective of this paper.

This paper uses an institutional perspective to clarify the relationship between entrepreneurial cognition and entrepreneurial activity across countries. Based on reviews of recent research, Randolph-Seng *et al.* (2015) suggested that entrepreneurial cognition research that emphasizes multi-level and dynamic perspectives be performed to reveal additional detail about how entrepreneurs think and act. Scholars have used many entrepreneurship models to explore the primary elements of new venture creation, but these models have had dissimilar limitations: For example, some have ignored environmental conditions, which are a significant part of the new venture creation process (Gnyawali and Fogel, 1994; Davidsson and Henkson, 2002), while others did not consider demographic elements (Krueger, *et al.*, 2000). In line with Acs *et al.*'s (2014) proposed perspective of a national system of entrepreneurship, which highlighted the combination of system-level and individual-level characteristics, we use a two-level (individual-level and country-level) model, which is also in response to research that has suggested that one level provides an incomplete view of variances in cross-country entrepreneurship (De Clercq *et al.*, 2013; Urbano and Alvarez, 2014; Lim *et al.*, 2016). We contribute to the discussion by integrating individual-level and country-level elements into the entrepreneurship field (e.g., De Clercq *et al.*, 2013; Urbano and Alvarez, 2014; Lim *et al.*, 2016) and by considering the joint effect of formal and informal institutions (Hayton *et al.*, 2002; De Clercq *et al.*, 2013) on the relationship between entrepreneurial cognition and innovative entrepreneurial activity (IEA). We then turn to cross-level interaction effects and suggest that the relationship between individual-level entrepreneurial cognition and IEA is moderated by institutional conditions like formal institutions (i.e., intellectual property rights and business freedom) and informal institutions (institutional collectivism, performance orientation, and uncertainty avoidance).

We test our theoretical model using data from the Global Entrepreneurship Monitor (GEM), the Global Leadership and Organizational Behavior Effectiveness (GLOBE) study, and the Index of Economic Freedom (IEF). We apply random-effects, multi-level analyses to a set of 1,004,620 observations from forty-nine countries spanning thirteen years (2001-2013). Cross-level moderation models reveal that individual-level effects in entrepreneurship have an impact on institutional conditions. Our research contributes to the existing body of the knowledge by establishing that the positive effects of entrepreneurial cognition and IEA are highly pronounced in national institutional conditions that support both formal and informal institutions.

The next section, which provides a critical examination of the existing literature, is followed by theory and hypotheses development. The methodology adopted in the research is elucidated thereafter. Then the process of implementing the model and the data used are explained. Results from the research follow, along with a discussion. Finally, the conclusion discusses the findings in the light of theory, draws implications for practice, and suggests possible avenues for future research.

### **Theoretical Framework:**

Building on institutional theory, a fundamental question for a sociological understanding of entrepreneurship concerns why nations have different rates of entrepreneurial activities (Aldrich, 2005). Using social cognitive theory, entrepreneurship cognition researchers have proposed that the answer may lie in the individual's role in the entrepreneurial process (cf. Mitchell *et al.*, 2002; Krueger, 2003; Baron, 2004). Our objective in this paper is to use the multi-level dynamics that lead to the emergence of IEA in a country and to combine institutional theory and social cognitive theory to document the effect of the institutional conditions. In this way we respond to Grégoire *et al.*'s

(2011) critical review on entrepreneurial cognition, which suggests that entrepreneurial cognition should be studied from a multi-level perspective if it is to explain variances in how individual's act.

Following the extant research, we consider institutional economics (North 1990; 2005) to be a suitable approach for the analysis of environmental factors that facilitate the creation of new businesses (Aidis *et al.*, 2008; Veciana and Urbano, 2008; Thornton *et al.*, 2011; Welter and Smallbone, 2011). In this context, Alvarez *et al.*, (2014) categorized institutional theory for entrepreneurship into two broad approaches: formal factors and informal factors. Culture is the most significant reflection of a society's informal institutions (North, 1990; Peng *et al.*, 2008), regulatory frameworks and incentive mechanisms represent a country's formal institutions (Salimath and Cullen, 2010). Both formal and informal institutional conditions can either foster or hinder the discovery and exploitation of entrepreneurial opportunities, so policy-makers can seek to create either an environment that nurtures them or one that does not. According to institutional theory, cultural, societal, and regulative influences create the framework that support organizations' establishment and survival (North, 1990), and a country's economic activities can be explained by societal and individual processes (Guiso *et al.*, 2006; Oyserman and Lee, 2008). Societal processes occur through formal and informal institutions (Greif, 2001; Witt and Redding, 2009), while individual processes function through individual cognition, beliefs, and motivations.

The decision to embark on new-venture creation encompasses choices (Gartner, 1985) that emphasize cognition (Mitchell *et al.*, 2002). Entrepreneurial cognition research has held the attention of many scholars, who use a number of dynamic approaches to examine entrepreneurs' minds and thinking (Randolph-Seng *et al.*, 2015), so it focuses on entrepreneurs' thinking style (Mitchell *et al.*, 2007). Entrepreneurs use their knowledge to make valuations, decisions and judgments, to recognize opportunities, and to build strategies for growth (Busenitz *et al.*, 2000; Mitchell *et al.*, 2000). The level of cognition is affected by individual perceptions about new venture creation, which are driven by sociological, personal, and environmental conditions (Linan *et al.*, 2011).

Research has provided theoretical evidence for entrepreneurship's being an individual-level phenomenon and has used formal and informal institutional conditions as country-level constructs (De Clercq *et al.*, 2010; Autio *et al.*, 2013). Research has also struggled with methodological challenges, as the nexus between institutions and entrepreneurship is multi-level in nature (Thomas and Mueller, 2000; Autio and Acs, 2010; Autio *et al.*, 2013; Laffranchini *et al.*, 2018). Some scholars (e.g., Uhlaner and Thurik, 2007; Pinillos and Reyes, 2011; Bullough *et al.*, 2014) have compared countries' levels of entrepreneurship by conducting country-level studies, while others (e.g., McGrath *et al.*, 1992; Thomas and Muller, 2000) have engaged in individual-level studies to observe the link between individuals' perceptions and behaviors. Only a handful of studies have addressed the multi-level nature of relationship between institutions and entrepreneurship by employing appropriate statistical techniques (Cullen *et al.*, 2014; Wennberg *et al.*, 2013; Stephan *et al.*, 2015). We follow these scholars' lead in seeking to bridge this gap methodologically and theoretically, positing that the dominant institutional environment in a society shapes individuals' behaviors and opportunity exploitations.

The outcome of the entrepreneurial process could be activity that can be described as productive, unproductive, or destructive (Baumol, 1990). According to Baumol (1990), institutional conditions play important role in these processes, and while the supply of entrepreneurs varies among societies, the productive contribution of the society's entrepreneurial activities varies much more because of the allocation of entrepreneurial energy. Depending on a society's institutions (i.e., the "rules of the game"), entrepreneurs have more time or less time to focus on productive activities like innovation versus unproductive activities like rent-seeking. The present research considers the multi-level perspective by investigating the joint effect of individual-level entrepreneurial cognition and country-level variables (formal and informal institutions) and how their interaction impacts

IEA. In this way, we build based on the empirical research that has built a multi-level perspective with social cognitive theory (Hitt *et al.*, 2007). We propose a framework in which institutional theory supports institutional conditions, and social cognitive theory supports human functioning (entrepreneurial cognition in our case). We examine the direct effects of individual-level entrepreneurial cognition on IEA and how country-level formal and information institutional conditions moderate this relationship. The conceptual framework is shown in Figure 1.

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Insert Figure 1 about here.

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### *Innovative entrepreneurial activity*

Like some other fields, entrepreneurship research suffers from the absence of a universal definition of entrepreneurship that can be applied and operationalized (Shane, 2003). One generally accepted definition is that entrepreneurship is an activity that involves the discovery, evaluation, and exploitation of opportunities to introduce new goods and services and ways of organizing markets, processes, and raw materials that previously had not existed (Venkataraman, 1997; Shane and Venkataraman, 2000). For the purposes of this paper, we define an entrepreneur as “one who owns, launches, manages, and assumes the risks of an economic venture” (Greve and Salaff, 2003). Most of the extant literature has relied on this definition of the entrepreneurship and has looked at entrepreneurship as the formation of a new firm and self-employment. Henrekson and Sanandaji (2014) argued that these measures of entrepreneurship fail to capture the effects of what they termed “high-impact Schumpeterian entrepreneurship.”

We focus on the opportunity-based aspects of new ventures’ entry by looking at individual actors, thus expanding on Autio and Acs (2010) work that builds on Davidsson’s (1991) observation that “the growth of entrepreneurial firms results from the quality of opportunities.” We focus on the study of IEA, rather than entrepreneurship in general, thereby building on the Schumpeterian view (1934) that entrepreneurship corresponds to bringing radical change and demanding innovation and creation through imagination, either bringing an entirely new market into existence or enhancing an existing market in a significant way. Previous research has suggested that opportunity entrepreneurship has a significant and positive effect on economic development, whereas necessity entrepreneurship has no effect (Acs and Varga, 2005), and that opportunity-driven entrepreneurship drives structural transformation in both modern and traditional sectors (Gries and Naudé, 2010). We seek to expand on the work on the quality of the entrepreneurship, rather than entrepreneurship in general. In doing so, our study contributes at the individual level, as we propose a refined measure of entrepreneurial cognition, show its relationship with IEA, and show that entrepreneurial cognition explains variations in IEA between countries.

### *Entrepreneurial cognition and innovative entrepreneurial activity*

Mitchell *et al.* (2000) defined entrepreneurial cognition as “knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth.” This definition contains two important elements: the decision-making process and the knowledge structure in the entrepreneurship context (Mitchell *et al.*, 2004). Mitchell *et al.* (2000; 2002) claimed that entrepreneurs produce cognitive scripts and exclusive knowledge structures that permit them to explore information in a more effective way than non-entrepreneurs do. Entrepreneurial cognition consists of the abilities, skills, attitudes, norms, and knowledge that an individual requires to create new ventures (e.g., the ability to recognize opportunities, to handle business dealings, and to recognize risk; Mitchell *et al.*, 2000; 2002). Entrepreneurial cognition allows the individual to use his or her ability, to understand the nature of his reality (expected



performance level), and to mobilize his or her self-efficacy to participate positively in entrepreneurial activity (Krueger *et al.*, 2000). Busenitz and Lau (1996) argued that individual entrepreneurs' cognitive ability predicts venture creation.

Social capital and social networks are important determinants of the recognition and exploitation of entrepreneurial opportunities (De Carolis and Saporito, 2006). Scholars that have examined entrepreneurial networks and the influence of role models have found that networks and actors influence opportunity recognition and entrepreneurial intentions (Aidis *et al.*, 2008, Brockhaus, 1982) and that an individual's social resources are important determinants of new venture creation and entrepreneurial success (Rauch and Frese, 2007; Unger *et al.*, 2011; Schlaegel and Koenig, 2014; Miao *et al.*, 2017). These cognitive resources are embodied in an individual's entrepreneurial capability and entrepreneurial willingness, both of which are positively associated with the decision to create a new venture (Mitchell *et al.*, 2000). In line with these arguments and based on social cognitive theory, we follow Aragon-Mendoza *et al.*'s (2016) conceptual measure of entrepreneurial cognition as the aggregation of self-efficacy, perceived opportunity, and fear of failure. Self-efficacy refers to an individual's cognitive estimate of his or her ability to mobilize motivation (Wennberg *et al.*, 2013), while perceived opportunity refers to an individual's readiness to engage in entrepreneurship (Renko *et al.*, 2012), and fear of failure is a self-evaluative framework that influences how one defines, orients to, and experiences failure in achievement situations (Heckhausen, 1991). Thus, the more capable and willing an individual is, the more capabilities he or she has, the more opportunities he or she perceives, and the less his or her fear of failure, especially within a business context, the more likely that individual to engage in innovative entrepreneurial activity.

Therefore, it is hypothesized that:

*H1: There is a positive relationship between entrepreneurial cognition and the likelihood of IEA.*

#### *Entrepreneurial cognition, protection of intellectual property rights, and IEA*

The protection of intellectual property rights is central to effective business transactions and governments, as it provides entrepreneurs with assurance of rewards for their positive contributions to society (Baumol, 1990). Regulations and effective enforcement are important aspects of the protection of intellectual property rights (Bowen and De Clercq, 2008), as they allow innovative businesses to function in a safe environment. Intellectual property rights that are not secure have a high demotivational impact on innovative entrepreneurs, who have much to lose if their innovations are not protected. However, societies with well-defined rules of law, effective legal systems, and clear support for intellectual property rights motivate entrepreneurs to launch innovative businesses (Levie and Autio 2011; Fuentelsaz *et al.*, 2015). In particular, the strength of the country's protection of intellectual property dictates the ease or difficulty with which someone can acquire the use of someone else's innovations. Based on the knowledge spillover theory of entrepreneurship, in a country that protects intellectual property, knowledge plays a role in the ability to spot and exploit opportunities, and entrepreneurs' talent and abilities lead to innovations (Acs and Audretsch, 1988). However, in countries that do not protect intellectual property sufficiently, innovation may be stifled by reducing expectations of gains from innovative activities. Estrin *et al.* (2013) contended that strong intellectual property protections promote entrepreneurial entry by fostering the agency beliefs (Harper, 2003) that lead to economic value creation, whereas weak property protections tend to scale down aspirations (Banerjee, 2003).

Bjornskov and Foss (2013), claimed that strong intellectual property rights facilitate innovative behavior and risk-taking, while Teece (1986), specified that they protect technology-based businesses from competitors. While strict intellectual property rights facilitate entrepreneurship, those that are too strict can also be barriers to new businesses. Therefore, we hypothesize that:



*H2: Strong property and intellectual property rights moderate the relationship between entrepreneurial cognition and IEA.*

*Entrepreneurial cognition, business freedom, and IEA*

Business freedom is another institutional element that facilitates entrepreneurship and is controlled by formal institutions. We follow IEF Index in defining a country's level of business freedom as *the extent to which the regulatory and infrastructure environments constrain the efficient operation of businesses* (IEF, 2016). Strict governmental regulations imposed on business creation make it difficult for entrepreneurs to start businesses. For example, in Singapore, the legalization process for new ventures can be completed in few hours, while countries like India, the process can take 30 days. Research has shown that strict entry regulations are a significant hurdle for new businesses (Levie and Autio, 2011).

Government interference beyond protecting intellectual property rights and sustaining the rule of law can inhibit individuals' ability (cognition in our case) to identify, evaluate, and exploit opportunities to create new goods or services. Entrepreneurial people are present in all societies, but the business environment they inhabit either stimulates or constrains their risk-taking behavior. By its very nature, regulation prevents companies and individuals from making choices they would have made in the absence of regulation. Hall *et al.* (2013) found in USA that a 1 percent increase in an area's economic freedom index consistently equates to more than a 2 per cent increase in the number of entrepreneurial start-ups. Similarly, more administrative requirements hurt new venture creation by obstructing entrepreneurs when they begin new businesses (Klapper *et al.*, 2006). As a result, countries that heavily restrict new venture creation tend to have more in the way of "informal" businesses because strict and costly regulations lead individuals to avoid registering their businesses. It is more difficult for larger companies to ignore these governmental regulations, as they have more visibility and cannot hide from government control (Dau and Cuerdo-Cazurra, 2014).

A society that puts a high value on productivity by permitting a high level of business freedom will be rewarded with a higher allocation of entrepreneurial energy to exploration and exploitation of innovative opportunities. On the other hand, a society with little business freedom will see more entrepreneurial energy devoted to non-productive activities like rent-seeking.

*H3: A high level of business freedom moderates the relationship between entrepreneurial cognition and IEA.*

*Entrepreneurial cognition, institutional collectivism, and IEA*

A society's culture influences its economic activities through collective, individual, and societal mechanisms (Guiso *et al.*, 2006; Oyserman and Lee, 2008). One of the most frequently studied cultural dimensions is that of institutional collectivism (Smith and Bond, 1993). Hofstede (1980) defined individualism as loose ties between individuals, where individuals' personal needs take precedence over those of the group. Conversely, in collectivist societies, individuals tend to be integrated into cohesive in-groups that protect them in exchange for group loyalty. Several studies have considered the relationship between the individualism/collectivism dimension and entrepreneurial behavior, finding that individualism is positively related to entrepreneurial behavior (Muller and Thomas, 2000; Taras *et al.*, 2010; Autio *et al.*, 2013) (although few studies—De Clercq *et al.*, (2010), and Pinillos and Reyes (2011) have reported empirical findings that conflict with this view). For example, Hayton *et al.* (2002) argued that individualism relates to entrepreneurship and innovation because entrepreneurship is the activity of innovative individuals who are rewarded individually.

A country's institutional characteristics can either encourage or discourage entrepreneurship (Salimath and Cullen, 2010), so individuals' cognitive resources play an important role in the

relationship between institutional characteristics and entrepreneurship (Mitchell *et al.*, 2000; Lim *et al.*, 2010). We take into account the resource-mobilizing aspect of entrepreneurship, which refers to entrepreneurs' need to find and leverage financial, social, and knowledge resources to launch their firms (Sørensen and Sorenson 2003). In societies with a high level of institutional collectivism, group loyalty is favored at the expense of maximizing individual income, so the effects of an individual's entrepreneurial cognition in pursuing innovative entrepreneurial activity may be inhibited. Hence, the importance of the individual-centric motivation to marshal resources to engage in innovative entrepreneurship is more important in institutionally individualistic societies because there are fewer institutionalized norms and social systems that work to decrease inequality (Thessen 1997). Therefore, we argue that societies that are characterized by low institutional collectivism and high entrepreneurial cognition are more likely to engage in IEA than are other societies.

*H4: A low level of institutional collectivism moderates the relationship between entrepreneurial cognition and IEA.*

#### *Entrepreneurial cognition, performance orientation, and IEA*

In the GLOBE study, the cultural dimension of performance orientation was grounded on McClelland's (1967), idea of achieving societies. Performance orientation explains the degree to which innovation, enhanced performance, and high standards are rewarded (Javidan, 2004). Scholars have put less emphasis on performance orientation than they have on the other cultural dimensions.

Entrepreneurship includes the risk-taking behaviors that are associated with the market and innovation (Shane *et al.*, 1995). Some promising models of entrepreneurship that have focused on the cognitive process have described the importance of opportunity and the cognitive infrastructure (Mitchell *et al.*, 2000; Alvarez and Busenitz, 2001). Entrepreneurial cognition reflects issues like knowledge about start-ups, the ability to accumulate required resources, the ability to recognize good business opportunities, and self-confidence in managing and succeeding in business (Busenitz *et al.*, 2000; Reynolds *et al.*, 2005). The ability to perform the business processes (entrepreneurial cognition) that are related to IEA is positively related to performance orientation, which is consistent with research like that of Wennberg *et al.* (2013), who studied the relationship between self-efficacy and entrepreneurial activity. Therefore, it is expected that, in nations in which people have strong entrepreneurial cognition and a high level of performance orientation, people tend to have a positive attitude about IEA.

*H5: A high level of performance orientation moderates the relationship between entrepreneurial cognition and IEA.*

#### *Entrepreneurial cognition, uncertainty avoidance, and IEA*

Uncertainty avoidance refers to the degree to which a society's rules, laws, and requirements increase the predictability of upcoming events and avoid turmoil and unpredictability (Venaik and Brewer, 2010). In countries with high uncertainty avoidance, people tend to be nervous about situations that they perceive as unstructured, uncertain, or unpredictable. Societies that have a high level of uncertainty avoidance sustain strict behaviors and intolerant ideas, while those with a low level of uncertainty avoidance are more relaxed (Puumalainen *et al.*, 2015). Acs and Karlsson (2002) argued that high uncertainty in institutional conditions causes entrepreneurs to enhance their cognitive capabilities concerning institutional change, as the uncertainties that entrepreneurs inevitably face help them identify opportunities and benefit from them (McMullen and Shepherd, 2006).

Uncertainty avoidance entails conflict concerning innovation, change, and risk (Hofstede, 1991), so countries with high uncertainty avoidance tend to provide little support for entrepreneurship and innovation (Shane, 1993; Hayton *et al.*, 2002) because customers prefer established products and

services to new and innovative ones, and investors prefer to invest in less risky businesses. Therefore, it is expected that, in societies that are characterized by a high level of uncertainty avoidance, an individual with a high level of entrepreneurial cognition is less likely to start a venture with a radically new innovation than he or she is in a country with a low level of uncertainty avoidance. Therefore, the following is hypothesized:

*H6: A low level of uncertainty avoidance moderates the relationship between entrepreneurial cognition and IEA.*

## **Methodology**

### *Sample and Data Collection*

We used a cross-sectional panel dataset in this study, using a number of sources to test the hypotheses. The dependent variable and all individual-level variables are based on data from the GEM's adult population survey (APS) from 2001 to 2013. GEM is an international project that examines the extent of entrepreneurial activities across borders and the effect of countries' activities on entrepreneurship. The project was launched in 1999 with participation of ten countries; since then each year new countries have joined the project, and now more than 100 countries are members of GEM. Every year each participating country collects a minimum of 2000 random samples of the adult population using professional research firms and asks them questions concerning their engagement and attitude toward entrepreneurship. The GEM provides rich, reliable, and valid data (Reynolds *et al.*, 2005).

Country-level data on formal institutions from the IEF (Miller *et al.*, 2012) and information on informal institutions from the GLOBE study (House *et al.*, 2004), GEM are combined with data on country-level institutions and control variables. After combining the data sources from 2001 to 2013, we had individual-level data from forty-nine countries and 1,004,620 interviews. We also used three individual-level and five national-level control variables.

### *Measures*

#### *Dependent variable (IEA)*

To measure country's approach to IEA, two questions from the GEM APS on entrepreneurs' innovativeness measured the newness level of entrepreneurs' products and services are new for all and some customers and other competitors' not offering similar product and services. On the bases of these questions, we measured IEA in terms of whether a proposed product or service was new, not familiar to many customers, and not offered by the other competitors. (See, e.g. González-Pernía *et al.*, 2015 for a more comprehensive description of the variable.) Our dependent variable observation is coded 1 if the product or service was an IEA (using these measures), and zero otherwise.

#### *Individual-level predictor variable*

We identified entrepreneurial cognition using three binary variables from APS that have been used in recent research (Aragon-Mendoza *et al.*, 2016). First, *self-efficacy* (an *ability* cognitive script), indicates whether the respondents have the knowledge, skills, and experience required to start a new business (1 = yes, 0 = no). Second, *perceived opportunity* (a *willingness* cognitive script) is determined by the answer to the following question: "In the next six months will there be good opportunities for starting a business in the area where you live?" (1 = yes, 0 = no). Third, *fear of failure* (an *arrangement* cognitive script) is determined by respondents' replies to whether fear of failure prevented them from starting a new business (1 = no, 0 = yes).

#### *Country-level predictor variables*

Current research uses five country-level institutions—the two formal institutions of *intellectual property rights* and *business freedom*—and three informal institutions—*institutional collectivism*,

*performance orientation*, and *uncertainty avoidance*. These five institutions are frequently studied in relation to cultural practices in societal contexts (Autio *et al.*, 2013). For the formal institutions of intellectual property rights and business freedom, we added the information provided by the IEF (Miller *et al.*, 2012), which measures the dimensions on a scale between 0 and 100 such that free (100-80), mostly free (79.9-70), moderately free (69.9-60), mostly unfree (59.9-50), and repressed (49.9-0). A high value in the dimension of intellectual property rights indicates that intellectual property rights are strictly protected, as in the case in Finland (with a score of 90.34), and a low value indicates loosely protected intellectual property rights, as in the case of Bolivia (with a score of 14.82). Strong protection of intellectual property rights secures citizens from illegal property expropriation, theft, and corrupt judiciary systems and so indicates the degree to which private property is secure. Business freedom refers to the degree to which government regulations facilitate individuals' ability to start their businesses and control the outcome. A high value in business freedom indicates that starting a business is matter of a few hours using flexible processes—for example, Singapore has a score of 98.72—while a low score in business freedom indicates that strict and costly processes are required to start a business, as is the case in India, with a score of 46.63.

The GLOBE study measures cultural practices on a scale from 1 to 7. Institutional collectivism is defined as “the degree to which organizational and societal institutional practices encourage and reward collective distribution of resources and collective action” [p. 30], so it is the cultural dimension that is most likely to inspire the allocation of resources to innovation. Performance orientation “reflects the extent to which a community encourages and rewards innovation, high standards, excellence, and performance improvement” [pp. 30, 239], so it reflects the society's existing practices regarding innovation, improvement, and reward systems. Uncertainty avoidance is “the extent to which a society, organization, or group relies on social norms, rules, and procedures to alleviate the unpredictability of future events” [p. 30], so it explains the degree to which people are made nervous by situations they perceive as unstructured, uncertain, or unpredictable. The resources and personal commitment individuals required before starting a business if they hope to see any type of return, so risk-taking is a crucial element for entrepreneurship (Kan and Tsai, 2006). Individuals' risk-taking ability is heavily influenced by their level of uncertainty avoidance.

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Insert Table 1 about here.

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#### *Cross-level interaction terms*

Five interaction terms were used to test the study's hypotheses. Mean standardized Z-scores were used for all country-level variables because data were obtained from multiple sources. Z-scores provide the measures with standard reference points (mean = 0 and standard deviation = 1) so comparisons will be meaningful, and they reduce the chances of multi-collinearity (Autio *et al.*, 2013; Pathak *et al.*, 2015). All country-level institutional variables were multiplied by the entrepreneurial cognition variable to produce the five interaction terms.

#### *Individual-level control variables*

In addition to our proposed model, we used three individual-level variables derived from the GEM as control variables. We found that these control variables correlate strongly with IEA. Two demographic variables included *gender*, an important element that affects entrepreneurship, as women tend to exhibit lower rates of entrepreneurial behavior than men (1 = male, 2 = female). The other demographic variable is *age*, as age influences entrepreneurial entry (Bosma *et al.*, 2009). Ages between 18 and 64 years were measured as a continuous variable (i.e. number of years). *Education* has also been associated with entry into entrepreneurship (Vinogradov and Kolvereid,

2007), so we controlled for education using a five-step categorical scale, where none = 0, some secondary education = 1, secondary education = 2, post-secondary education = 3, and graduate school = 4.

#### *Country-level Control Variables*

We added five national-level control variables that influence IEA and that have been used frequently in research. Research has suggested that a country's level of economic development influences the nature and distribution of entrepreneurial activity (Van Stel *et al.*, 2005). The present research uses *gross domestic product (GDP) per capita* and *population size* for each country from 2001 to 2013, data which was obtained from Political Risk Services (PRS). Two dimensions of cultural practices used as control variables were obtained from the GLOBE study: *assertiveness*, which is "the degree to which individuals are assertive, confrontational, and aggressive in their relationships with others" [p. 30], and *in-group collectivism*, which is "the degree to which individuals express pride, loyalty, and cohesiveness in their organizations or families" [p. 30]. Finally, we controlled for *freedom from corruption*, adopted from the IEF. Such control is a predictor of IEA because freedom from corruption lessens the uncertainties that new businesses face (Anokhin and Schulze, 2009). All national-level predictors and control variables are z-standardized because they were obtained from different data sources that have different interpretations.

#### **Results**

The objective of this study is to determine the individual-level effects of entrepreneurial cognition on individuals' IEA and the interaction effects by which two country-level formal institutions and three informal institutions moderate the effect of individual entrepreneurial cognition on an individual's IEA.

Table 1 contains information about the sample characteristics of predictor variables. Table 2 provides descriptive statistics for all study variables. Table 3 shows the correlation matrix for the individual-level and country-level controls and predictors used in this study. Table 4 describes our regression results. We computed variance inflation factor (VIF) scores for all variables included in the study in order to check for multi-collinearity issues. The maximum inflation factor score is 6.37 for corruption, and none of the VIF scores exceed the value of 10, thereby providing evidence of no multi-collinearity between study variables (Bowerman and O'Connell, 1990).

Table 4 (column 1) shows the result of entering only control variables in investigating the variance in IEA. Table 4 (column 2) introduces all predictor variables. Table 4 shows that the variance of random intercept decreases from column 1 (0.47) to column 2 (0.17). The variance component explains that, when the predictor variables are introduced, they add 64 percent ( $((0.47 - 0.17) / 0.47) * 100$ ) to explain the country-level variance that exists in the IEA.

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Insert Table 2 about here.

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Table 4 shows the effect on IEA of the random effect logistic regression models. We adopted a three-step testing strategy to analyze the hypotheses. In the first step, all individual-level and country-level control variables are included to estimate the proportion of variance they explain. The second step adds all predictors in order to estimate their influence on IEA (Table 4, column 2). Finally, in the third step, the interaction terms of each dimension of institutions are added (Table 4, columns 3-7) by multiplying the two country-level formal institutions and three informal institutions by the individual-level entrepreneurial cognition to produce the five interaction terms for IEA. Table 4's columns 1 and 2 report the odds ratio (OR), where  $OR > 1$  indicates a positive

relationship, and  $OR < 1$  indicates a negative relationship. Table 4's columns 3-7 report the beta coefficients of the mixed effect logistic regression.

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Insert Table 3 about here.

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Insert Table 4 about here.

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Individuals with high entrepreneurial cognition are an average of more than two times ( $OR = 2.48$ ,  $p < 0.000$ ) more likely to enter into IEA than are those who have low entrepreneurial cognition. These findings support our individual-level hypothesis (H1) in that individuals' entrepreneurial cognition is positively associated with IEA. The current study does not hypothesize the direct impacts of institutional conditions on IEA, but the odd ratios' outcomes indicate that there is a negative relationship between intellectual property rights and IEA and a 3 percent increase in the probability of IEA in countries with business freedom ( $OR = 1.03$ ;  $p < 0.10$ ). The results reveal that institutional collectivism decreases the probability of IEA by 22 percent ( $1 - 0.78$ ;  $p < 0.01$ ), and performance orientation increases the probability of IEA by 35 percent ( $OR = 1.35$ ;  $p < 0.01$ ). No significant probability of IEA is found for uncertainty avoidance.

In order to investigate hypotheses H2-H6, we introduced the cross-level moderation effects between entrepreneurial cognition and institutional conditions (Table 4, columns 3-7). The results of the moderating role of the interaction between entrepreneurial cognition and formal institutions of intellectual property rights ( $\beta = 0.19$ ;  $p < 0.001$ ) and business freedom ( $\beta = 0.14$ ;  $p < 0.001$ ) revealed positive and significant relationships. The moderating effects of the interaction between entrepreneurial cognition and the three informal institutions of institutional collectivism ( $\beta = 0.05$ ;  $p < 0.001$ ), performance orientation, ( $\beta = 0.08$ ;  $p < 0.001$ ), and uncertainty avoidance ( $\beta = 0.11$ ;  $p < 0.001$ ) are also positive. Thus, we find support for H2, H3, H4, H5, and H6.

## Discussion and Conclusion

The decision to initiate an innovative business includes an important legitimacy trade-off that may be affected by the national culture and the regulatory environment. To explain why some individuals pursue innovative entrepreneurship and others do not, theories about individual-level resources and a framework within which those elements effect entrepreneurial behavior must be developed (Davidsson and Wiklund, 2001; Phan, 2004). This study contributes to the comparative entrepreneurship literature by examining the moderation effects of individual-level entrepreneurial cognition and national-level institutional conditions on the relationship between entrepreneurial cognition and IEA. The role of individual resources on the relationship between institutional conditions and new venture creation has been examined rarely (Elam, 2006). Most studies have used a single-level framework that cannot reveal the relationships regarding decisions about new venture creation at the national and individual levels (Klein and Kozlowski, 2000; Autio and Acs, 2010). Our work shows that how individual-level entrepreneurial cognitions and the institutional conditions following suitable function of formal and informal institutions contingencies contribute towards IEA.

Institutional theory suggests that culture motivates certain types of behavior both directly through the values that are unique to a society and indirectly through the institutions that are given meaning by the culture. Based on institutional theorists (Hofstede, 1980; North, 1990; Triandis, 1995), who have set forth that a country's values, beliefs, and "rules of the game" influence the degree to which certain behaviors are seen as legitimate and acceptable. However, how the link between institutions

and behavior works to influence entrepreneurial outcomes has been left to others (Kreiser *et al.*, 2010). The results of this study suggest that a country's formal and informal institutional conditions affect individuals' innovative behavior. Unlike much of the previous research conducted on this topic, we examine the impact of institutional conditions on a key dimension of entrepreneurial quality: IEA.

Using a cross-sectional panel dataset from 2001 to 2013, this study contributes to the comparative international entrepreneurship literature by investigating the cross-level interaction effects of entrepreneurial cognition and country-level institutional conditions on the likelihood of IEA. We analyzed a large sample of 1,004,620 individuals from forty-nine countries using individual-level and country-level control variables. All of the controls have been considered important elements of entrepreneurial activities (De Clercq *et al.*, 2013; Wennberg *et al.*, 2013; Walter and Block, 2016). We addressed the literature's methodological shortcomings by complementing extant work and examining IEA from a multi-dimensional perspective (as a combination of product and market innovation), testing individual-level and context effects, acknowledging non-linear relationships, and using multi-level statistical techniques that explain cross-country differences that are new to the field. Examining this relationship advances the consideration of the macro-level limits of applying individuals' entrepreneurial cognition to IEA. We obtained the results we expected, as we find a direct positive relationship between individual entrepreneurial cognition and individual engagement in IEA. The findings of interaction effects between entrepreneurial cognition and institutional conditions indicate support for our theoretical arguments.

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Insert Figure 2 about here.

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We used three individual-level and five national-level control variables that have been considered important components of high-quality entrepreneurship. We find that *age* is negatively linked with IEA, which is consistent with previous research (Estrin *et al.*, 2013; Laplume *et al.*, 2014). Using *gender*, another important element in venture creation, we find that women are less likely to start their own innovative ventures than men are, a result that is also consistent with prior research (Laplume *et al.*, 2014; Ioannis *et al.*, 2017). We use *education*, which increases individuals' attitudes about and skills for venture creation, as a control variable and find that those who have higher levels of education are more likely to start their own innovative ventures than are those that do not, which is also consistent with previous research (Ioannis *et al.*, 2017).

At the national level, we controlled for five variables. We find that *GDP per capita (ppp)*, which has often been used in empirical research, has a positive relationship with IEA, a finding that is consistent with previous research on high-quality ventures (Terjseen and Hessels, 2009; Autio and Acs, 2010). Our finding related to *population* are also similar to those of earlier literature on high-quality entrepreneurship (Autio *et al.*, 2013). Our findings regarding *corruption*, which discourages new venture creation, suggest a negative relationship with IEA, consistent with Walter and Block (2016). We used two culture-based control variables and find a negative relationship between *assertiveness* and IEA, consistent with Cullen *et al.* (2013) and Wennberg *et al.* (2013), but no significance for *in-group collectivism*.

We plotted unstandardized solutions for the two-way interaction between a continuous variable and a dummy-coded dichotomous moderator for all significant interaction terms (Figures 2A-E). We find that a country's *intellectual property rights* positively moderate the individual-level relationship between entrepreneurial cognition and IEA. The moderation effect shown in Figure 2A explains that the association between individuals with high entrepreneurial cognition and a country



with a high level of intellectual property rights has a significant effect on the likelihood of IEA. Most individuals pay less attention to agreements for innovative businesses than they do to whether strong formal institutions facilitate economic dealings, which decreases transaction costs (Aidis *et al.*, 2008). Our findings, which are in line with Autio and Acs (2010), are that strong property rights have a positive effect on the relationship between quality of entrepreneurship and personal income. Countries with intellectual property rights that secure multinational companies' innovations may ultimately become beneficial for national-level firms and entrepreneurs.

Another formal institution interaction effect of our study shows that *business freedom* positively moderates the individual-level relationship between entrepreneurial cognition and IEA (Figure 2B). This moderation effect explains that those in countries with a high level of business freedom are more likely to be involved in IEA if they have a high level of entrepreneurial cognition. Klapper *et al.* (2006) claimed that a high number of administrative requirements decreases new venture creation. Therefore, we find that a high level of individual cognitive skills, combined with administrative simplification, promotes the quality of entrepreneurship.

We find that *institutional collectivism* has a positive and significant moderation effect on the individual-level relationship between entrepreneurial cognition and IEA. This moderation effect, plotted in Figure 2C, indicates that individuals are more likely to engage in IEA in countries with high entrepreneurial cognition and low institutional collectivism. Our findings are similar to those of previous research that has highlighted the negative impact of institutional collectivism on entrepreneurial entry (Pinillos and Reyes, 2011; Autio *et al.*, 2013). The results of our analysis suggest that institutional collectivism that is positively associated with the relationship of individuals' entrepreneurial cognition on IEA, because an individual's confidence in his or her ability to achieve would alleviate the negative effect of collectivist behaviors.

Figure 2D shows the positive and significant interaction effect of *performance orientation* on the individual-level relationship between entrepreneurial cognition and IEA. This moderation effect explains why those who have high entrepreneurial cognition and live in countries with high performance orientation are more likely than others to engage in IEA. We also find support for *uncertainty avoidance's* positive moderation of the individual-level relationship between entrepreneurial cognition and IEA (Figure 2E). Therefore, our results suggest that IEA thrives in countries with low uncertainty avoidance and high entrepreneurial cognition. The results also show that trust in individuals' capabilities and strong entrepreneurial cognition to succeed may partially protect individuals from the negative impact of national cultural norms on IEA. An individual with high entrepreneurial cognitive abilities is more likely to become an innovative entrepreneur in a country with low uncertainty avoidance. The current research contributes to the growing literatures on institutional theory (e.g., Elam and Terjesen, 2010; Walter and Block, 2016), social cognitive theory (e.g., Hmieleski and Baron, 2009) and quality of entrepreneurship (e.g., Giotopoulos *et al.*, 2017). Researchers have started to use the quality of entrepreneurship (Giotopoulos *et al.*, 2017) in their research, as it supports countries' economies in adverse times more than a high quantity of typical startups does (e.g., Shane, 2009). This study investigates the contextual contingencies of entrepreneurial cognition by arguing that national-level institutional conditions are important for the outcomes of IEA. In addition, the study shows that individual-level variables that are systematically entangled with and embedded in both entrepreneurial cognition and institutional conditions motivate IEA. Our findings contribute to the literature by indicating that understanding innovative entrepreneurial outcomes requires considering country-level institutional conditions. This insight is also helpful for policymakers since various aspects of institutions should be pursued to add to the quality of entrepreneurship.

#### *Limitations and Future Research*

This research has limitations that offer some avenues for future research. First, all of the data were obtained from secondary sources that the literature has identified as valid, but secondary data sources do not always offer accurate data (Aragon-Mendoza *et al.*, 2016). It is also possible that GEM data, which is cross-sectional by nature, reflects the likelihood that the act of having started an innovative venture enhances individuals' entrepreneurial cognition. An experimental longitudinal study in this context would help to address this issue. GEM surveys also use single-item variables that, while established as having adequate estimated reliability (Wanous and Reichers, 1996) and validity related to multi-item measures (Bergkvist and Rossiter, 2007), need special attention for interpolation.

On the individual level, we considered entrepreneurial cognition as perceptions, but they could be influenced by other attributes, such as demographics, experiences, and social position, and the possibility of these influences also deserves further scrutiny. We also emphasized on quality entrepreneurship as IEA, although there are other drivers of quality entrepreneurship, such as high growth expectations and international orientation (Giotopoulos, *et al.*, 2017), which might behave differently.

We focused on two formal institutions, intellectual property rights and business freedom, to define countries' regulatory environments (Stenholm *et al.*, 2013), although many more regulatory and economic variables need consideration. We also emphasized informal cultural institutions like collectivism, performance orientation, and uncertainty avoidance to unpack the relationship between national institutional conditions and IEA. There are many more informal institutions that could influence other entrepreneurial behaviors and that could be subjects of future research.

In this study, we analyzed the impact of individual cognitive processes on entrepreneurs' choices to create innovative ventures (De Clercq *et al.*, 2013) but not the dynamics that might develop individual-level entrepreneurial cognition enforced by national-level institutional conditions. While our focus in this study is on country-level institutions, more work is needed to explore the dynamics between institutions and IEA at and between other levels of analysis. Linking the institutional contexts of sector and industry may shed light on how individual-level (e.g., personality traits) characteristics interact with country-level institutions in the context of IEA. While this study is one of the few attempts in the entrepreneurship literature to provide insights into the role of national institutional conditions on individual-level IEA, future research could use qualitative research by means of interviews with entrepreneurs. Finally, we captured formal and informal institutions through what is commonly seen as the most salient unit of analysis from which to derive national proxies (Peterson *et al.*, 2012), but more variance could be explained by studying more fine-grained groupings of institutions on the regional or neighborhood level (Klyver and Foley, 2012) and at the individual level using national culture as a proxy for cultural practices.

#### *Implications for policy-makers*

From a practical perspective, the significant interaction between individual and institutional conditions suggests that policy-makers can design their environments to provide individuals who have high entrepreneurial cognition with the right institutional support to ensure the efficient allocation of entrepreneurial resources. The implications of our paper support an integrative approach, suggesting that national culture and the national regulatory framework are important to ensure high-quality entrepreneurship in a country.

Our findings suggest that countries' formal institutional conditions (property rights and business freedom) impact their IEA. We propose that policy-makers comprehend the risk entrepreneurs bear in working to perform IEA in challenging environments. To enhance innovative entrepreneurship, countries' policy-makers should work toward increasing entrepreneurship's quality, rather than its quantity, by applying the policy tools that support new IEA based on the cognitive individual resources they most want to influence. Our study shows that the effects of institutional conditions

and their interactions with individual-level entrepreneurial cognition combine to suggest various courses of actions for policy-makers to increase their overall innovative entrepreneurship rate over that of those that focus only on encouraging highly qualified individuals to engage in entrepreneurship. For example, policy-makers can encourage higher levels of IEA by encouraging individuals with low entrepreneurial cognition to create new ventures while also introducing programs and policy that could improve the institutional environment.

Our study shows that countries with low levels of institutional collectivism and uncertainty avoidance and countries with high levels of performance orientation improve the quality of entrepreneurship in their countries. National culture influences individuals' psychological characteristics to increase the supply of potential entrepreneurs (Davidsson and Wiklund, 1997). Therefore, culture is important because it influences individuals' motives, values, and beliefs. To encourage IEA, societies with low institutional collectivism should promote an image of entrepreneurship as an act of celebrating individuals and their societal contributions. Similarly, policy-makers should initiate mechanisms that mitigate the risks associated with resource investments, thereby helping mitigate the negative effect of cultural uncertainty avoidance.

Finally, by highlighting entrepreneurship as a lifestyle choice, rather than merely as a way to become rich, might help entrepreneurship in societies that have low performance orientations.

For entrepreneurship education, our research suggests that enhancing knowledge about intellectual property rights and business regulation could be an important route to increasing innovative entrepreneurship among university graduates and women—both of which are high on many countries' policy agendas. Thus, universities that offer courses for entrepreneurs should widen their offerings to include courses that deal with the regulatory environment, with a focus on regulations related to intellectual property protection and business operations. Doing so would create value for students.

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**Table 1.** Sample characteristics

Country	IEA <sup>a</sup>	0=IEA <sup>a</sup>	1= IEA <sup>a</sup>	IEA <sup>a</sup> (%)	IPR <sup>b</sup>	BF <sup>b</sup>	IC <sup>d</sup>	PO <sup>d</sup>	UA <sup>d</sup>
Argentina	14,671	13,883	788	5.37	30.39	67.33	3.66	3.63	3.63
Australia	11,035	10,649	386	3.50	90	87.27	4.31	4.37	4.4
Austria	6,938	6,758	180	2.59	90	72.07	4.34	4.47	5.1
Bolivia	5,119	4,818	301	5.88	14.82	57.85	3.96	3.57	3.32
Brazil	28,584	28,348	236	0.83	50	58.65	3.94	4.11	3.74
Canada	4,864	4,759	105	2.16	90	87.55	4.36	4.46	4.54
China	26,315	25,572	743	2.82	22.71	49.6	4.67	4.37	4.81
Colombia	34,774	32,363	2,411	6.93	46.91	83.34	3.84	3.93	3.62
Costa Rica	3,402	3,292	110	3.23	52.99	58.28	3.95	4.1	3.84
Denmark	27,092	26,495	597	2.20	90.22	95.67	4.93	4.4	5.32
Ecuador	9,348	8,735	613	6.56	22.81	54.18	3.82	4.06	3.63
Egypt	7,286	7,189	97	1.33	38.3	63.21	4.36	4.15	3.97
Finland	18,684	18,388	296	1.58	90.34	90.9	4.77	4.02	5.11
France	17,450	17,225	225	1.29	73.66	79.62	4.2	4.43	4.66
Germany	54,352	53,377	975	1.79	90	80.38	3.67	4.16	5.19
Greece	15,330	15,016	314	2.05	51.28	73.61	3.41	3.34	3.52
Guatemala	6,192	5,842	350	5.65	33.67	52.78	3.78	3.85	3.44
Hong Kong	5,096	5,017	79	1.55	90	96.88	4.03	4.69	4.17
Hungary	19,743	19,537	206	1.04	69	73.23	3.63	3.5	3.26
India	14,862	14,611	251	1.69	50	46.63	4.25	4.11	4.02
Indonesia	6,169	5,950	219	3.55	30	49.22	4.27	4.14	3.92
Ireland	15,738	15,283	455	2.89	90	89.68	4.57	4.3	4.25
Israel	13,486	13,219	267	1.98	70	67.83	4.4	4.03	3.97
Italy	20,967	20,780	187	0.89	58.27	74.7	3.75	3.66	3.85
Japan	16,032	15,904	128	0.80	75.55	80.74	5.23	4.22	4.07
Kazakhstan	1,376	1,361	15	1.09	30	58.5	4.38	3.72	3.76
Malaysia	8,304	8,197	107	1.29	51.2	71.62	4.45	4.16	4.59
Mexico	14,171	13,805	366	2.58	50	79.56	3.95	3.97	4.06
Morocco	1,422	1,406	16	1.13	35	76.2	4.18	4.31	3.95
Netherlands	23,254	22,757	497	2.14	90	78.85	4.62	4.46	4.81
New Zealand	4,077	3,966	111	2.72	90	85	4.96	4.86	4.86
Nigeria	4,581	4,261	320	6.99	30	53.88	4	3.79	4.14
Philippines	4,235	4,068	167	3.94	30	53.43	4.37	4.21	3.69
Poland	10,666	10,450	216	2.03	61.84	65.69	4.51	3.96	3.71
Portugal	9,771	9,613	158	1.62	70	77.92	4.02	3.65	3.96
Russia	18,876	18,737	139	0.74	26.47	55.77	4.57	3.53	3.09
Singapore	14,610	14,346	264	1.81	90	98.72	4.77	4.81	5.16
South Africa	15,267	14,819	448	2.93	50	71.85	4.47	4.72	4.64
South Korea	11,522	11,294	228	1.98	76.33	84.18	5.2	4.53	3.52
Spain	211,250	208,326	2,924	1.38	70	76.72	3.87	4	3.95
Sweden	40,864	40,448	416	1.02	90.18	76.35	5.26	3.67	5.36
Switzerland	15,773	15,411	362	2.30	90	76.25	4.2	5.04	5.42
Taiwan	7,803	7,676	127	1.63	70	81.49	4.3	4.27	4.04
Thailand	11,558	11,131	427	3.69	49.55	71.8	3.88	3.84	3.79
Turkey	12,098	11,804	294	2.43	50	67.9	4.02	3.82	3.67
United Kingdom	115,189	112,668	2,521	2.19	89.84	89.05	4.31	4.16	4.7
United States	35,387	34,029	1,358	3.84	87.92	88.87	4.21	4.45	4.15
Venezuela	5,104	4,970	134	2.63	17.16	50.28	3.96	3.41	3.55
Zambia	3,933	3,692	241	6.13	30	63.68	4.41	4.01	3.92

Note: IEA is the total number of innovative entrepreneurial activity observations per country.

IEA=0 represent the individuals in particular country have not considered as innovative entrepreneurial activity.

IEA=1 represent the individuals in particular country have considered as innovative entrepreneurial activity.

IEA (%) shows the percentage of individuals per country identified as innovative entrepreneurial activity.

IPR shows aggregated score for intellectual property rights.

BF shows aggregated score for business freedom.

IC shows score for cultural practice institutional collectivism.

PO shows score for cultural practice performance orientation.

UA shows score for cultural practice uncertainty avoidance.

<sup>a</sup> Source: Adult Population Survey (APS) from Global Entrepreneurship Monitor (GEM) 2001 – 2013.

<sup>b</sup> Source: Index of Economic Freedom (IEF) 2001 – 2013.

<sup>d</sup> Source: Global Leadership and Organizational Behaviour (GLOBE).

**Table 2.** Descriptive statistics

<b>Variable</b>	<b>N</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>SD</b>
Individual level					
Innovative entrepreneurial activity	1,004,620	0	1	.022	.147
Age	1,004,620	18	64	40.57	12.880
Gender	1,004,620	1	2	1.52	.503
Education	1,004,620	0	4	2.14	1.082
Entrepreneurial cognition	1,004,620	0	3	1.345	.949
Country level					
GDP per capital (PPP), USD	49	468	85819	26692.88	15948.233
Population in million	49	2.76	1354.34	102.122	230.253
Assertiveness	49	3.41	4.77	4.215	.323
In-group collectivism	49	3.46	6.37	4.959	.735
Freedom from corruption	49	19	100	64.08	21.748
Intellectual property rights	49	5	95	69.46	21.271
Business freedom	49	36	100	76.80	12.875
Institutional collectivism	49	3.41	5.26	4.199	.443
Performance orientation	49	3.34	5.04	4.091	.316
Uncertainty avoidance	49	3.09	5.42	4.2825	.606

**Table 3.** Correlation matrix (based on  $N = 1,004,620$ )

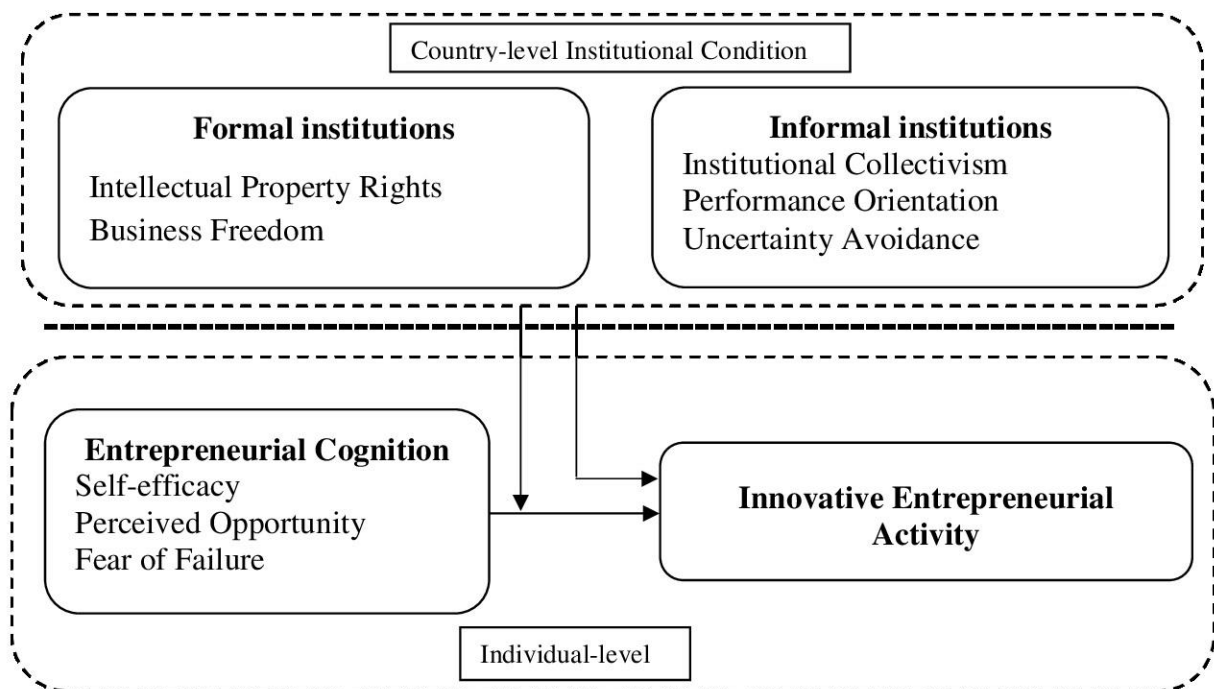
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Individual level															
1. Innovative entrepreneurial activity	1														
2. Entrepreneurial cognition	.135**	1													
Country level															
3. Intellectual property rights	-.035**	-.057**	1												
4. Business freedom	-.002*	-.024**	.735**	1											
5. Institutional collectivism	-.015**	-.002*	.261**	.148**	1										
6. Performance orientation	.006**	.013**	.380**	.300**	.324**	1									
7. Uncertainty avoidance	-.017**	.007**	.631**	.391**	.485**	.511**	1								
Control Variables															
8. Age	-.031**	-.032**	.124**	.113**	-.006**	.028**	.058**	1							
9. Gender	-.032**	-.142**	.006**	.010**	-.002*	.002*	.005**	.023**	1						
10. Education	.042**	.075**	.171**	.200**	.121**	.075**	.080**	-.091**	-.018**	1					
11. GDP per capital (PPP), USD	-.026**	-.059**	.770**	.648**	.284**	.278**	.547**	.132**	.009**	.208**	1				
12. Population in million	.004**	.012**	-.340**	-.402**	.114**	.140**	.038**	-.041**	-.012**	-.041**	-.274**	1			
13. Assertiveness	-.004**	-.037**	.236**	.220**	-.634**	.172**	-.071**	.058**	.003**	.020**	.139**	-.224**	1		
14. In-group collectivism	.011**	-.044**	-.721**	-.491**	-.480**	-.266**	-.728**	-.075**	-.018**	-.152**	-.658**	.211**	.064**	1	
15. Freedom from corruption	-.033**	-.047**	.927**	.695**	.364**	.397**	.735**	.125**	.007**	.168**	.811**	-.306**	.122**	-.758**	1

**Table 4.** Regression results predicting innovative entrepreneurial activity.

	1	2	3	4	5	6	7
Control variables (Individual-level)							
Age	0.98***(0.00)	0.98***(0.00)	-0.01***(0.00)	-0.01***(0.00)	-0.01***(0.00)	-0.01***(0.00)	-0.01***(0.00)
Gender	0.64***(0.01)	0.79***(0.01)	-0.22***(0.01)	-0.23***(0.01)	-0.23***(0.01)	-0.23***(0.01)	-0.23***(0.01)
Education	1.36***(0.01)	1.26***(0.01)	0.23***(0.01)	0.23***(0.01)	0.24***(0.01)	0.24***(0.01)	0.24***(0.01)
Control variables (Country-level)							
GDP per capital (PPP), USD	1.23***(0.02)	1.23***(0.02)	0.21***(0.02)	0.21***(0.02)	0.21***(0.02)	0.21***(0.02)	0.21***(0.02)
Population in million	0.96*(0.01)	0.96***(0.01)	-0.04*(0.01)	-0.04*(0.01)	-0.04***(0.01)	-0.04***(0.01)	-0.04***(0.01)
Assertiveness	0.93(0.08)	0.88+(0.08)	-0.11+(0.07)	-0.11+(0.07)	-0.12+(0.06)	-0.12+(0.06)	-0.13+(0.06)
In-group collectivism	1.30***(0.14)	0.95(0.09)	-0.06(0.10)	-0.06(0.09)	-0.04(0.09)	-0.04(0.09)	-0.04(0.09)
Freedom from corruption	0.99(0.05)	0.88*(0.05)	-0.14***(0.05)	-0.11*(0.05)	-0.11*(0.05)	-0.11*(0.05)	-0.12*(0.05)
Main Effect (Individual-level)							
Entrepreneurial cognition	<b>H1</b>	<b>2.48***(0.02)</b>	0.92***(0.01)	0.91***(0.01)	0.92***(0.01)	0.91***(0.01)	0.92***(0.01)
Main Effects (country-level)							
Intellectual property rights		0.77***(0.03)	-0.03***(0.00)	-0.30***(0.04)	-0.26***(0.04)	-0.27***(0.04)	-0.27***(0.04)
Business freedom		1.03+(0.02)	0.03(0.02)	0.02****(0.00)	0.03+(0.02)	0.03(0.02)	0.03(0.02)
Institutional collectivism		0.78***(0.06)	-0.24***(0.08)	-0.24***(0.08)	-0.79****(0.20)	-0.23***(0.08)	-0.25***(0.08)
Performance orientation		1.25***(0.09)	0.24***(0.07)	0.24***(0.07)	0.23***(0.07)	0.18(0.23)	0.24***(0.07)
Uncertainty avoidance		0.98(0.11)	-0.01(0.10)	-0.02(0.10)	-0.03(0.09)	-0.01(0.10)	-0.42*(0.17)
Cross-level interaction terms							
Entrepreneurial cognition X Intellectual property rights	<b>H2</b>		<b>0.19****(0.01)</b>				
Entrepreneurial cognition X Business freedom	<b>H3</b>			<b>0.14****(0.01)</b>			
Entrepreneurial cognition X Institutional collectivism	<b>H4</b>				<b>0.05****(0.01)</b>		
Entrepreneurial cognition X Performance orientation	<b>H5</b>					<b>0.08****(0.01)</b>	
Entrepreneurial cognition X Uncertainty avoidance	<b>H6</b>						<b>0.11****(0.01)</b>
Random part estimates							
Variance of intercept	0.47(.09)	0.17(0.04)	0.18(0.04)	0.18(0.04)	0.17(0.04)	0.17(0.04)	0.17(0.04)
Model fit statistics							
Number of observation	1,004,620	1,004,620	1,004,620	1,004,620	1,004,620	1,004,620	1,004,620
Number of group (countries)	49	49	49	49	49	49	49
Degree of freedom (number of variables)	7	14	15	15	15	15	15
Chi-square	3840.83	14900.52	15,148.70	15,107.50	14935.07	14948.34	14,973.00
Probability > chi-square	***	***	***	***	***	***	***
Log likelihood	-101,573	-95,004	-94,731	-94,824	-94,988	-94,964	-94,913
Likelihood ratio (LR) test for goodness of fit	***	***	***	***	***	***	***

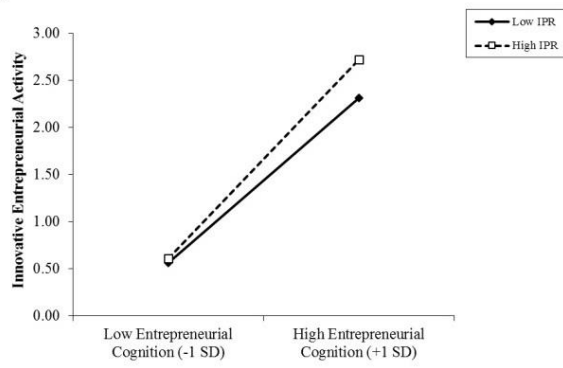
Notes: Standard errors are in parentheses. Bold values indicate variables testing the hypotheses. \*\*\*p < 0.001; \*\*p < 0.01; \*p < 0.05; +p < 0.10, ORs in columns 1 and 2, above 1 represent a positive relationship, ORs below 1 represent a negative relationship; columns 3–8 explained beta coefficients needed to plot the interactions





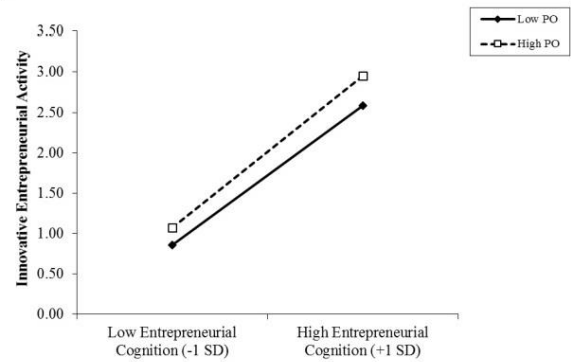
**Figure 1.** Theoretical model.

**A**



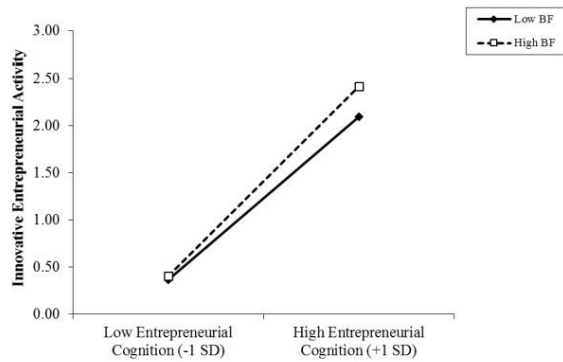
Interaction between individual-level entrepreneurial cognition and country-level intellectual property rights.

**D**



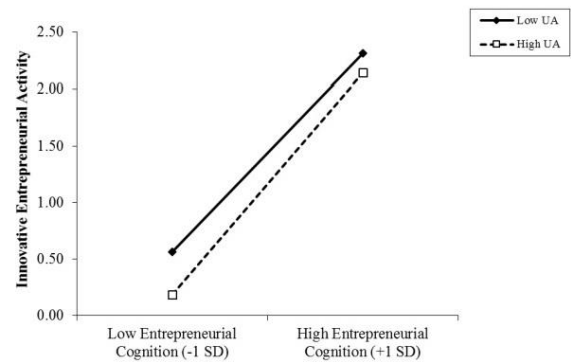
Interaction between individual-level entrepreneurial cognition and country-level performance orientation.

**B**



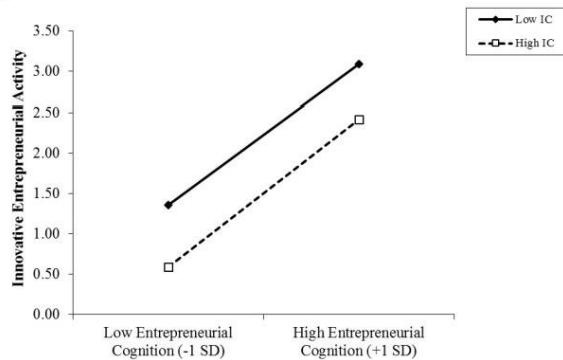
Interaction between individual-level entrepreneurial cognition and country-level business freedom.

**E**



Interaction between individual-level entrepreneurial cognition and country-level uncertainty avoidance.

**C**



Interaction between individual-level entrepreneurial cognition and country-level institutional collectivism.

**Figure 2.** Moderating effects of institutional conditions (A-E) and entrepreneurial cognition on IEA.